Heart Intelligibility and CHD: new approaches to patient diagnostics and care

Any psychic anxiety, evident in pain and pleasure, hope and pleasure, hope and fear,forms the basis of excitation spreading its influence to the heart.
William Harway,1628

Yabluchanskiy M.

How we still understand CHD

Standard definition

A general reason for various types of CHD is cardiac muscle abnormality in consequence of disparity between oxygen delivery of myocardium and its necessity

Standard understanding of etymology

Problems of cardiac coronary arteries

- atherosclerosis
- spasm
- thrombosis
- inflammation
- congenital anomaly
- others

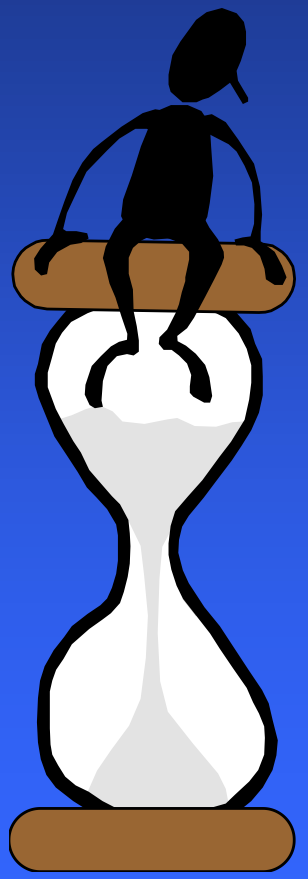
E.P Selvan

CHD in Harrisosn's internal diseases principles

Are CHD problems only limited by the coronary circulation disturbance consequences caused by a heart needs conflict in a real oxygen delivery to it?

R.Rosenman. Integr Physiol Behav Sci. 1993;28(1)

- Smoking, high level of cholesterol or inactive lifestyle form a small part of the causes that bring on a heart diseases.



S.Thomas et al. Am J Crit Care. 1997;6(2)

- The research of stenocardia attacks shows that an emotional state of patients and relationship between patients are so important as CHD itself and prognosis for it.

H.Eysenck. Br J Med Psychol. 1988;61(Pt1)

- 30 years' research showed that an emotional stress played a more important part in an oncological mortality and in a cardiac death than smoking ;
- Among people who cannot keep a stress under control a death rate is 40% higher than among those who have managed to cope with it.

T.Allison et al. Am J Epidemeiol. 1997;70(8)

- According to Mayo Clinic data the provoking key factor among cardiac catastrophes such as stenocardia attack and cardiac death rate is psychological stress.

B.Penninx et al. Am J Epidemiol.1997;146(6)

- Multicentral research of more than 2,829 patients aged 55-85 showed that the people who can resist strokes of fate suffer from cardiac diseases 60% less in comparison with those who fail to face life difficulties.

L.Kubzanovsky et al. Circulation.1997;95(4)

- 20 years experience of conducting 1,700 elderly patients showed that an anxiety about social conditions, health or even finance significantly increases a risk of bringing on cardiac diseases.

M.Mittleman et al. Circulation. 1995;92(7)

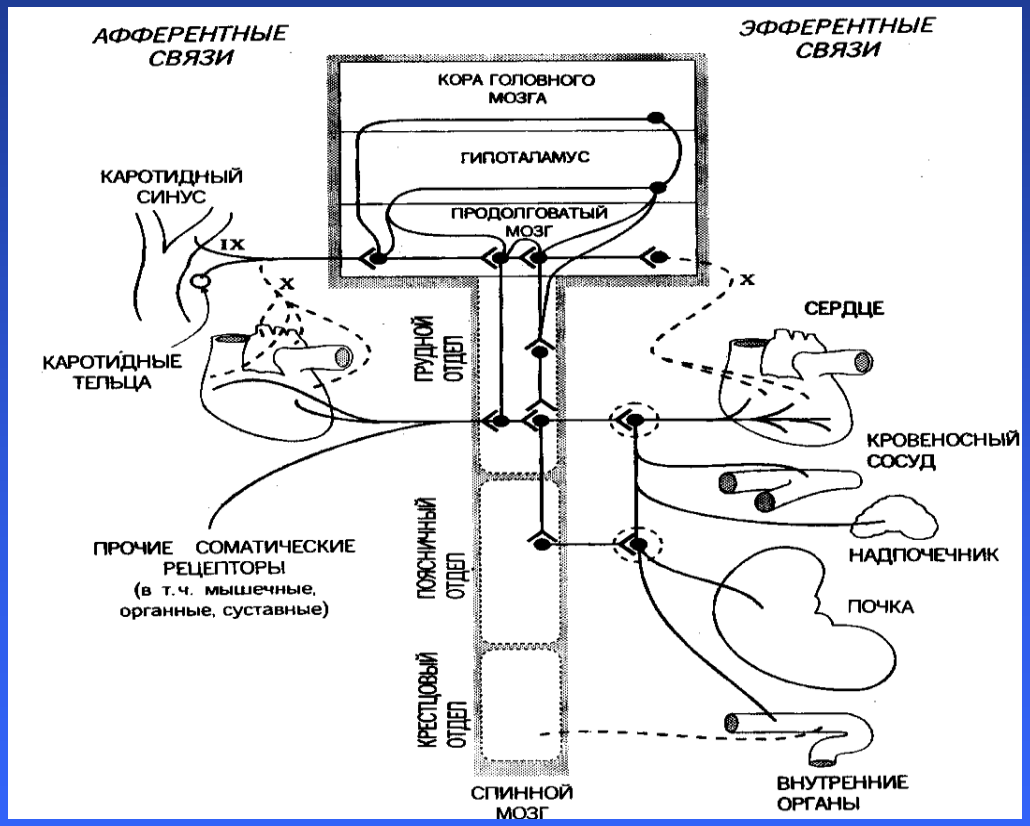
- **Staff members of Harward School of Medicine examine 1,623 patients suffering from stenocardia and discovered that a risk of attack at an emotional stress state is two times higher than at a calm state.**

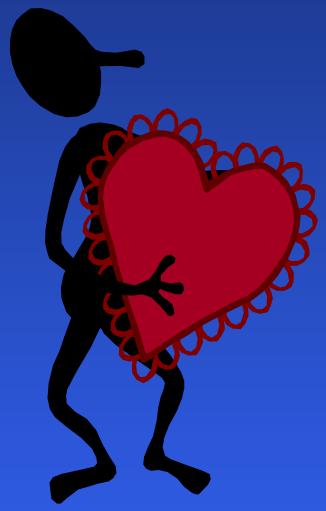
-What can we see?

- In CHD the key role is performed by heart *intelligibility*!

Why so?

Cardiac innervation





Innervation is a flowers

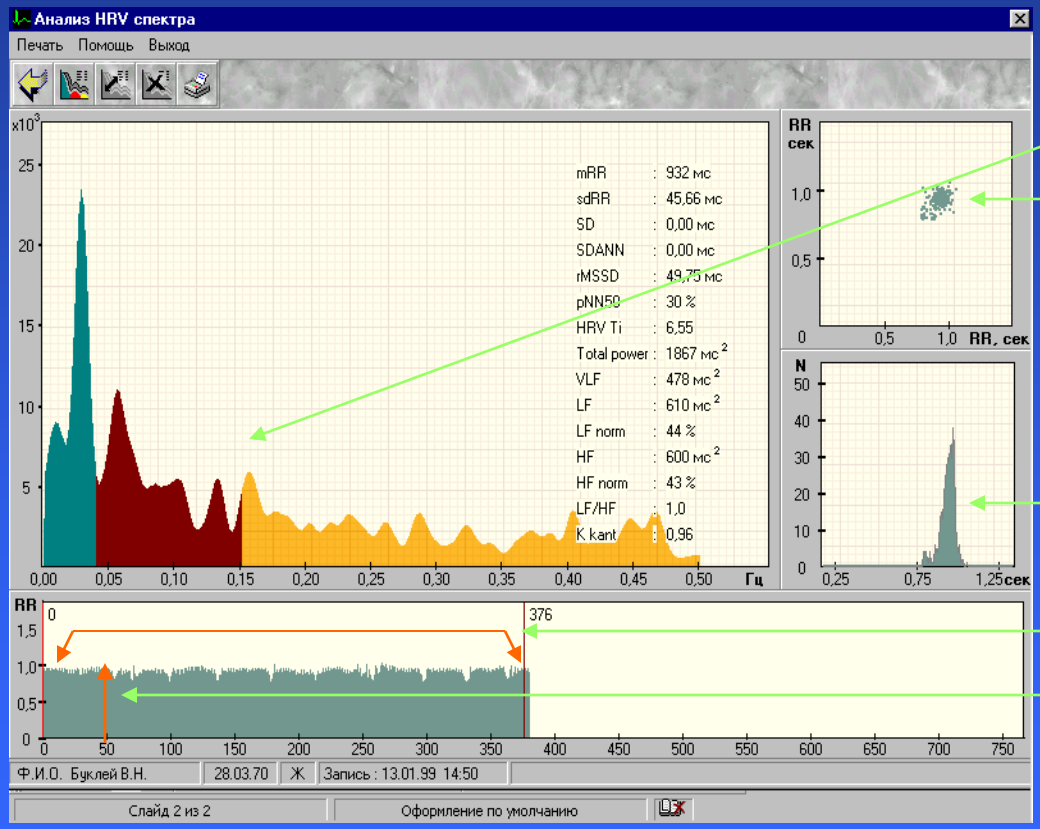
- Innervation is an upper level of the more ancient humoral regulation
- There is a single united neurohumoral regulation (NHR)
- – NHR will entirely echo
  - – And what about the heart?
  - – In intelligibility! It cannot reflect if it’s “overloaded” with adelphan

The key to the intelligibility of the heart
- Heart Rate Variability Technology

HRV Technology is an instrument:

- Evaluation of health resource and quality
- Defining the probability of qualitative and timely recovering
- Acute condition of chronic disease prevention exacerbation
- Application of medicaments, doses, schemes of use
- Control, optimizing and prognosing of treatment results
- Indicating the catastrophic health disorders search of effective methods of their prevention
- Planning and control of physical activity in everyday life and in sports
- Professional selection
- Evaluation and increasing the life quality

Technology of heart rate variability (HRV) power spectrum analysis – it is very simple



Spectrum dimension
RR-intervalgram

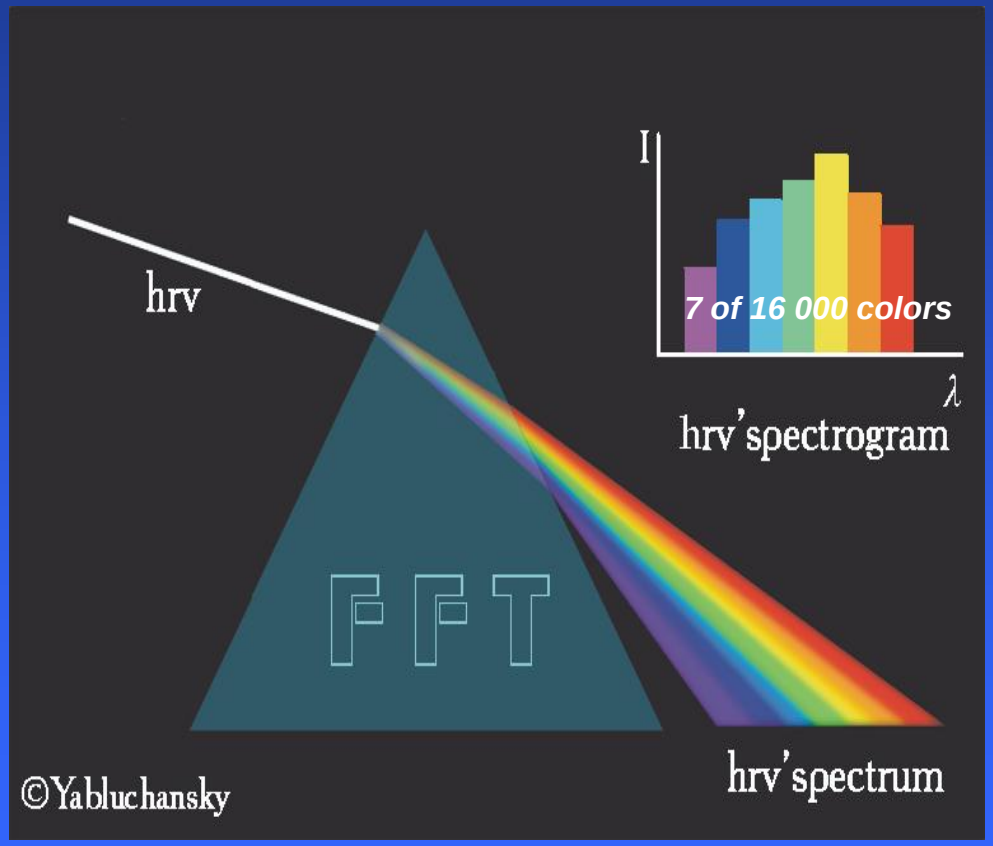
RR-skatergram

Length distribution
RR-intervals

RR-intervalgram

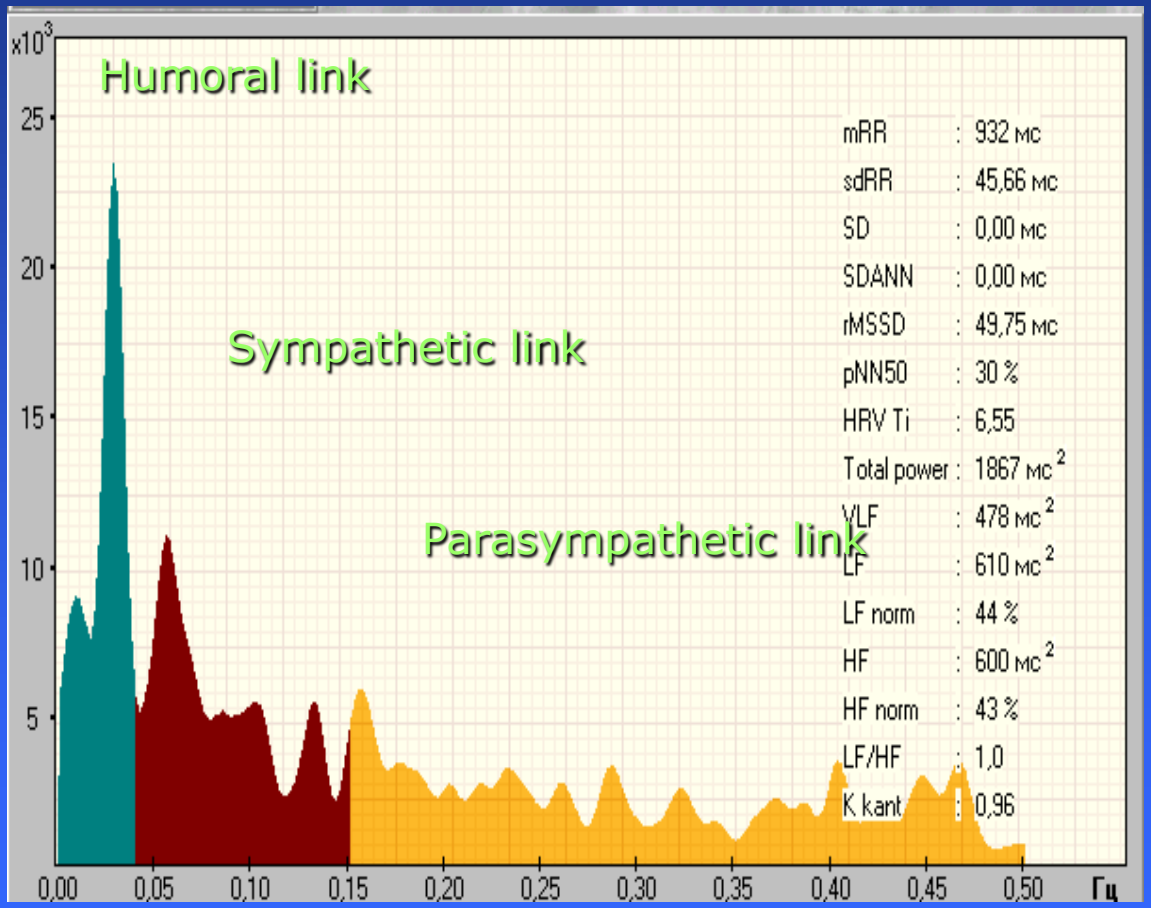
RR-interval

Technology of heart rate variability (HRV) power spectrum analysis – it is very simple



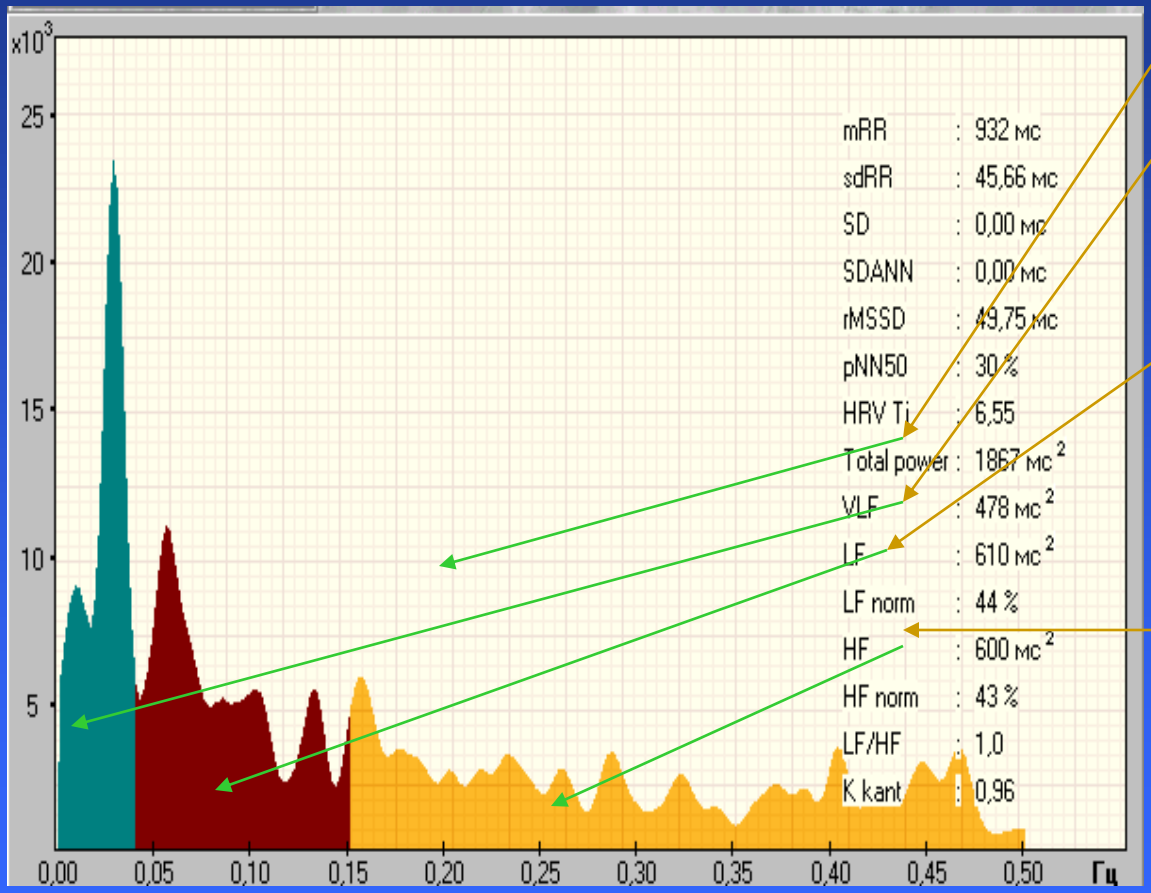
- Cardiac rate like white light is consist of elementary rhythms
- HRV is a quality measurement of cardiac rate
- HRV spectrum analysis is a cardiac rate dimension into the elementary rhythm spectrum
- Spectrum analysis technology is a fast Furie and other methods transformation; it is like a prism that resolves white light into elementary lights
- HRV spectrum – «rainbow»
- «Rainbow» characteristics in spectrogram «Rainbow» quality – cardiac rate quality
- Cardiac rate quality is a quality of heart rate systems management

Technology of heart rate variability (HRV) power spectrum analysis – it is very simple



According to the experimental results HRV spectrum is divided into three parts of different colors, in which humoral,sympathetic and parasympathetic regulations are “concentrated”

Technology of heart rate variability (HRV) power spectrum analysis – it is very simple



Square under a spectrum curve – total power regulation

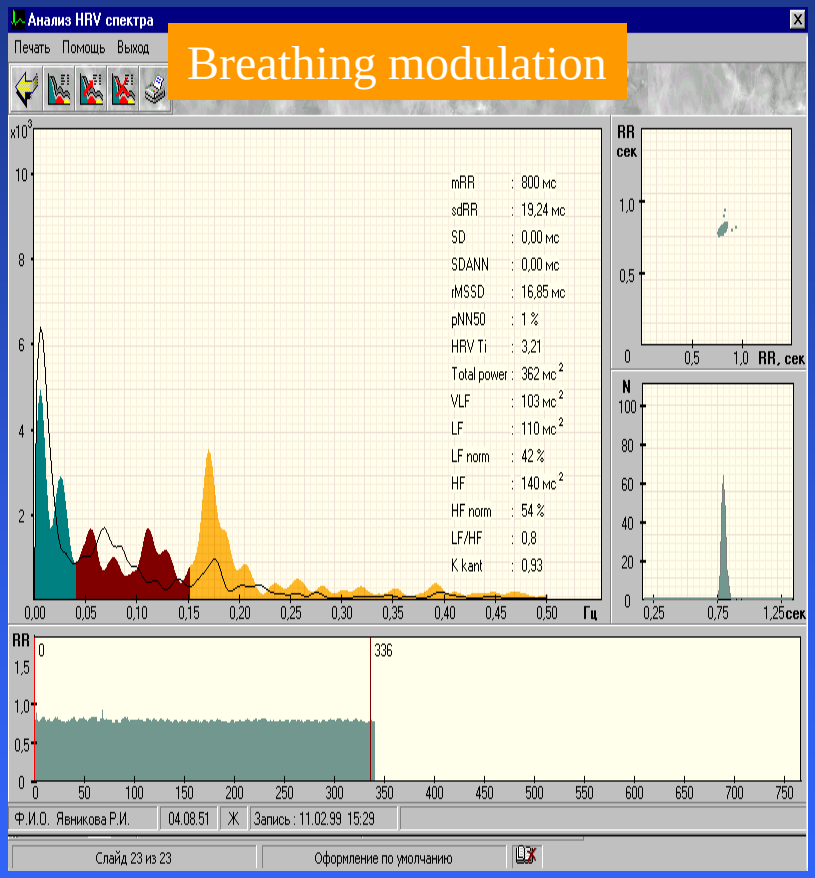
Square under "humoral" section of a spectrum curve – power of humoral regulation,

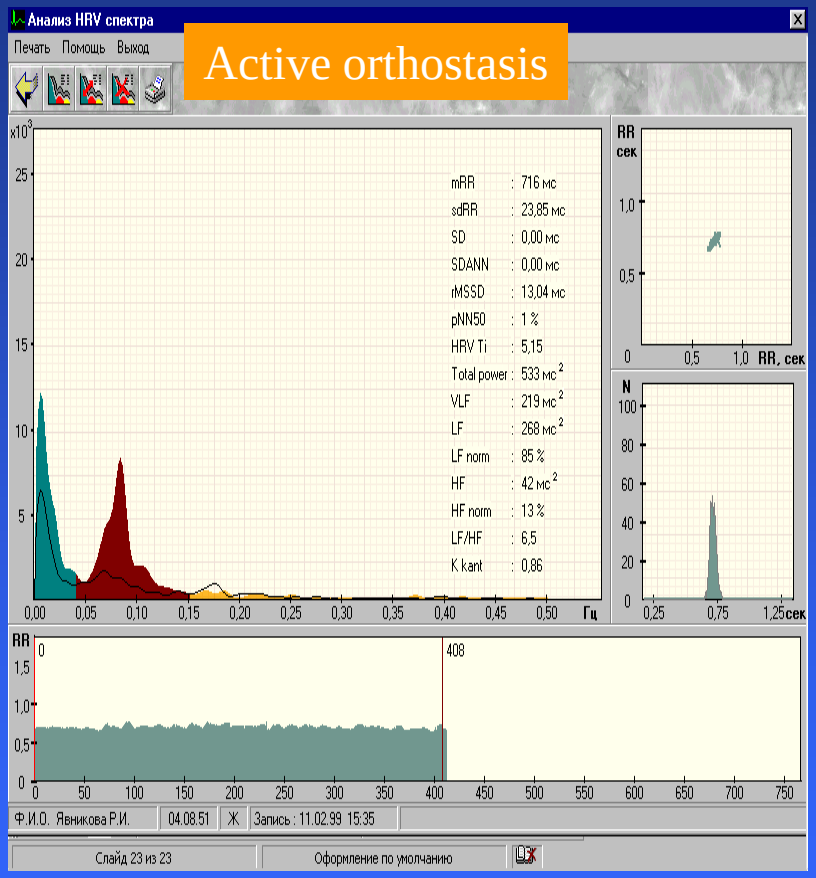
Square under "sympathetic" section of a spectrum curve – power of sympathetic regulation,

Square under "parasympathetic" section of of a spectrum curve – power of parasympathetic regulation

HRV – “echo” regulation processes:

breathing regulation reaction and active orthostasis





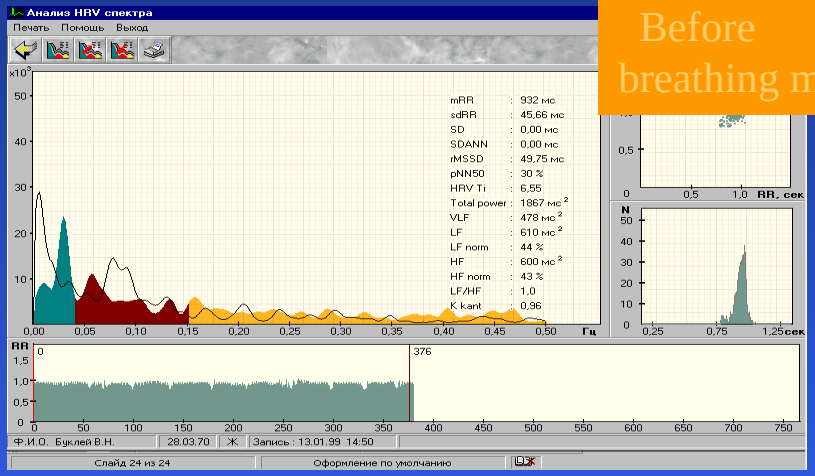
Breathing modulation increases high frequency (parasympathetic) power and active orthostasis – low frequency (sympathetic) link of HRV spectrum

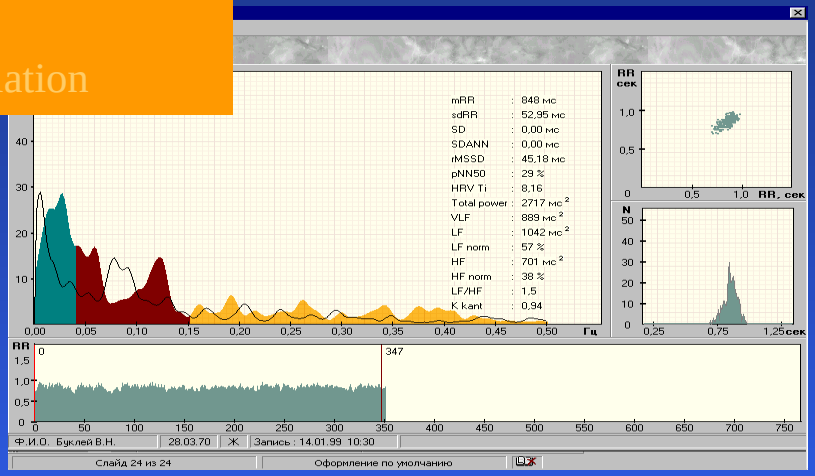
HRV – “echo” of regulation processes:
breathing regulation in basal conditions, acute pharmacological tests *with theofedrin and anaprilin have the HRV - equivalents*

theofedrin

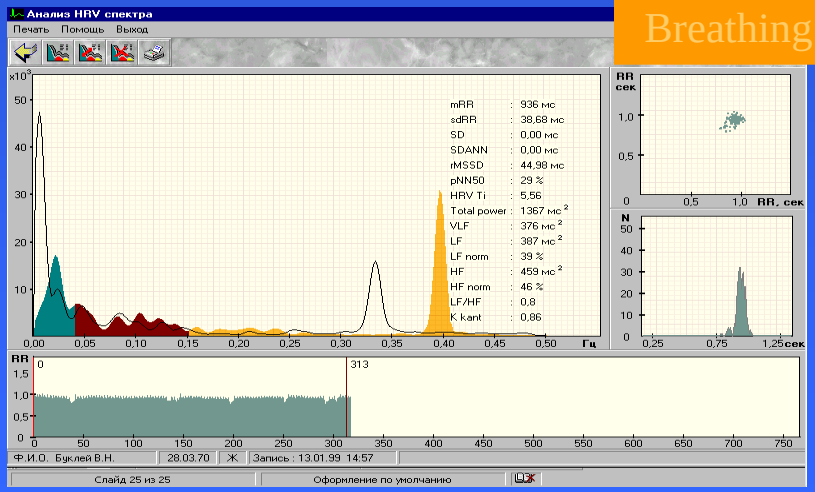
anaprilin

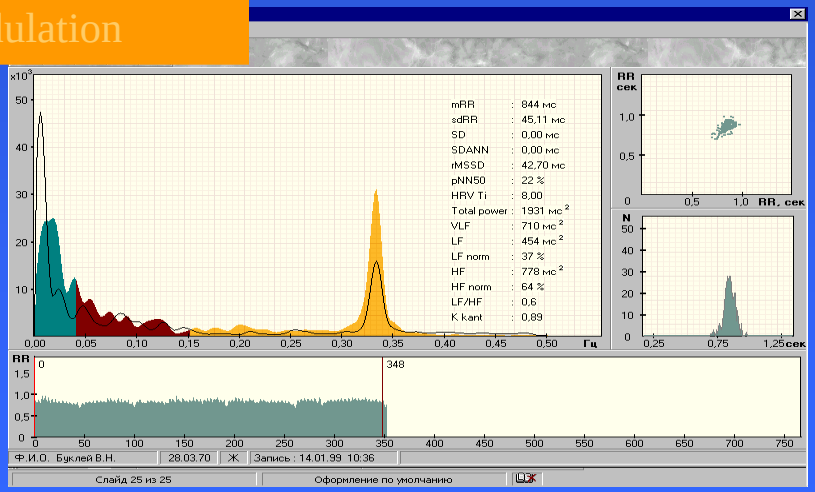
Before
breathing modulation





Breathing modulation

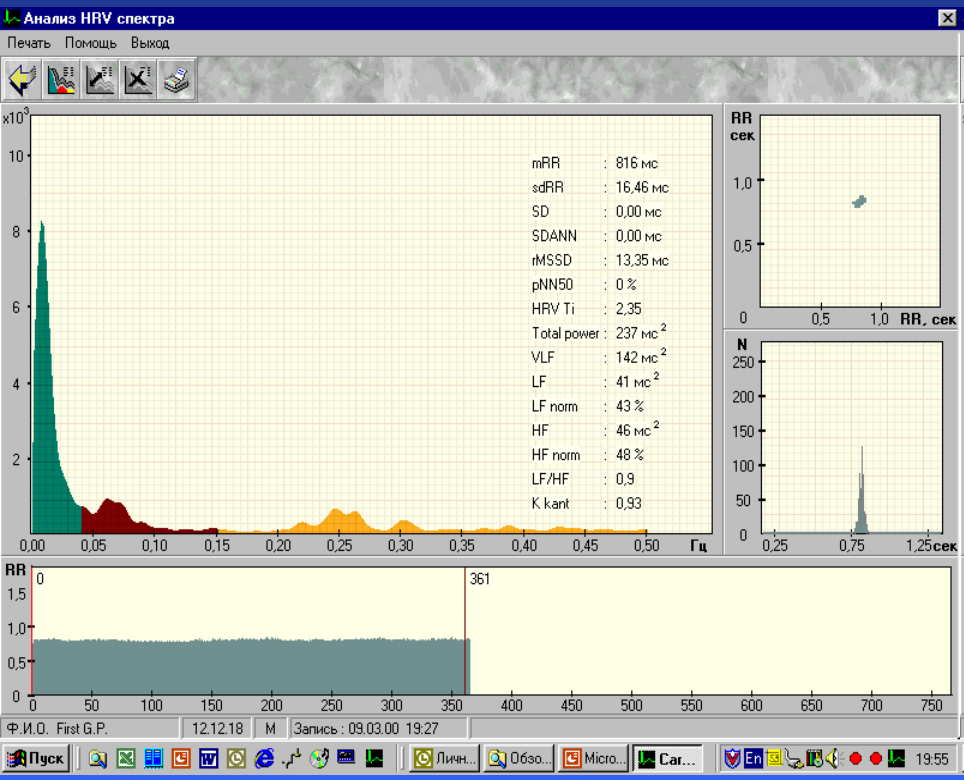


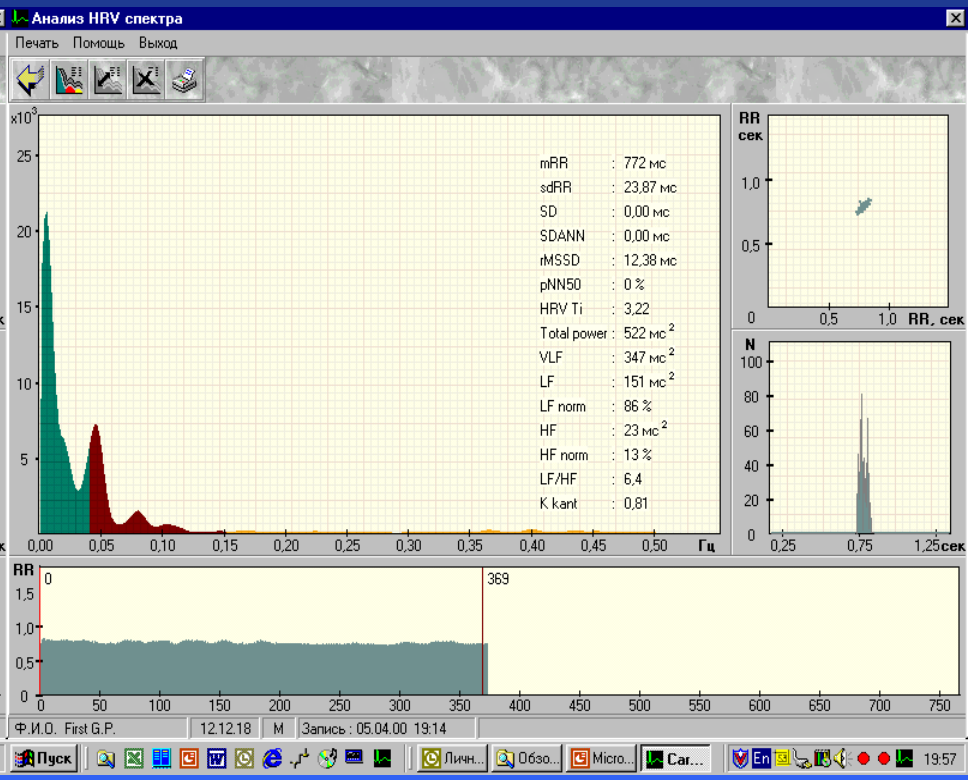


Neurohumoral regulation of CHD patients

- **Low power of NHR**
- **High power of NHR**
- **Predominance of humoral and sympathetic regulations**
- **Degeneracy of parasympathetic regulation**
- **Excessive growth of parasympathetic regulation**
- **Displacement of sympathetic – vagal balance to the sympathetic link of vegetative regulation**
- **Disorders of NHR systems reaction to the physiological stress**

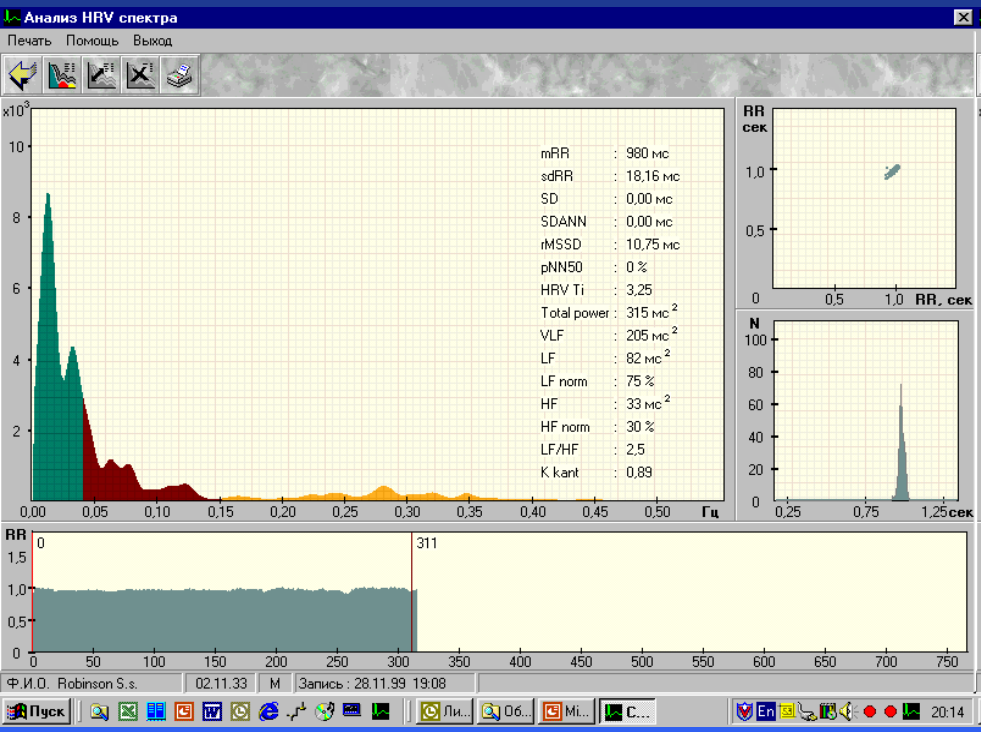
Patient A., 72

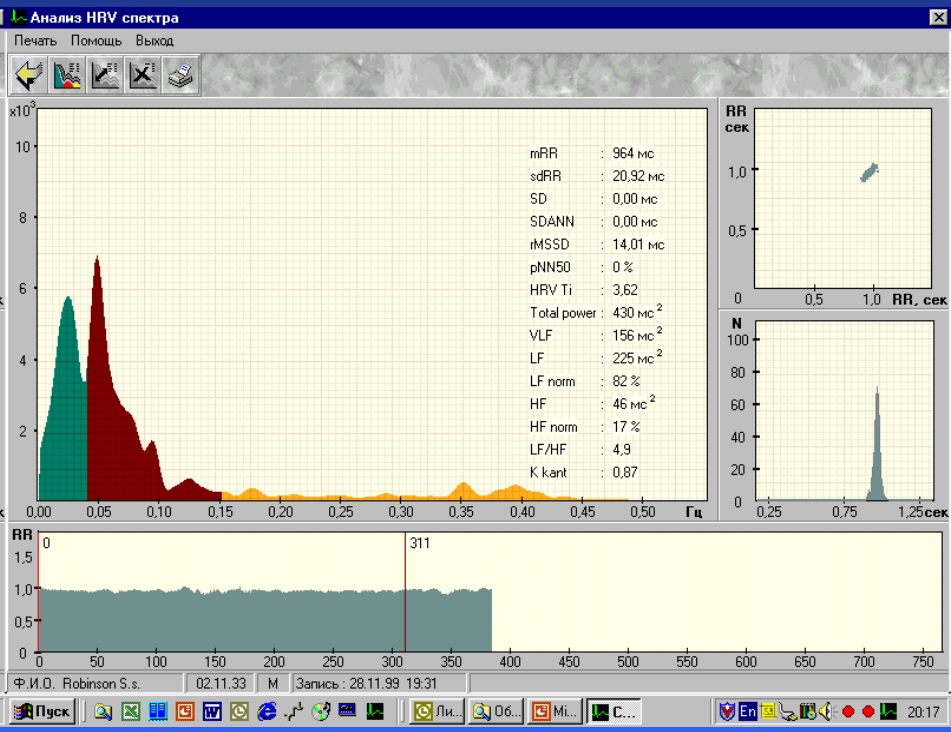




Before and after treatment of enapapril maleat (enap (KRKA),2,5 mg\day), low spectrum power two times increasing, disappearance of paraxisms

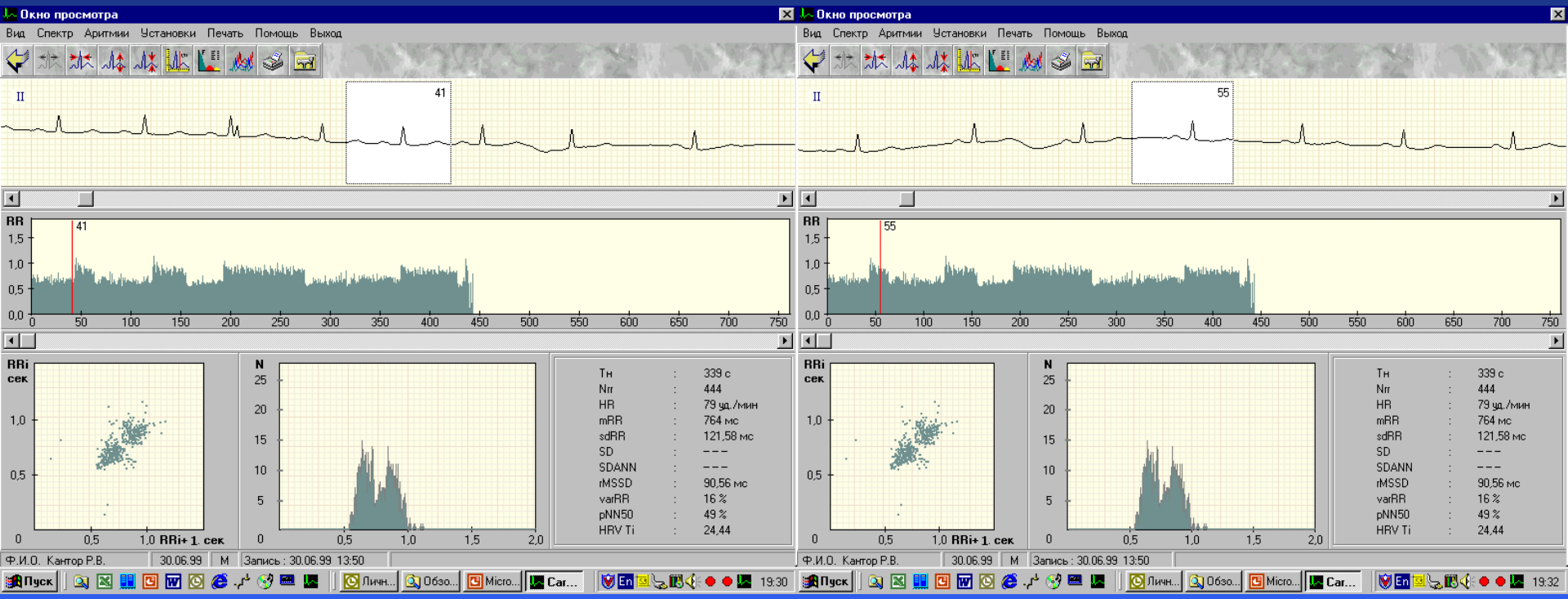
Patient B, 68





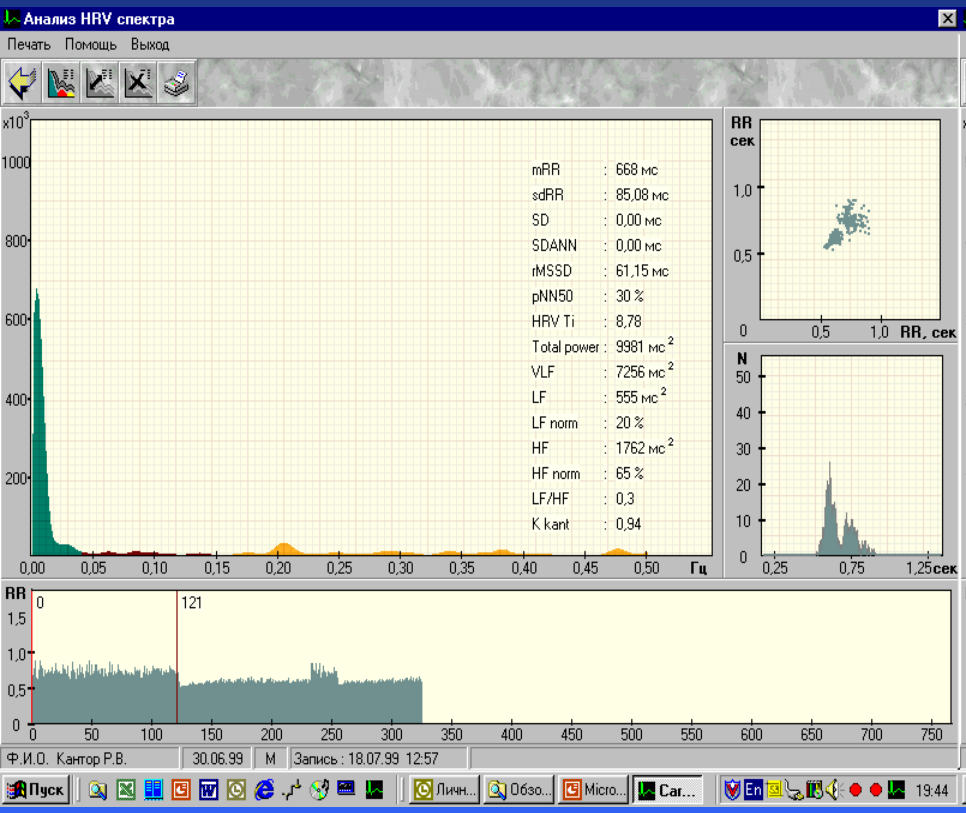
An hour later after 2,5 mg of enapril maleat spectrum power increased in 1,5 times with changes of a very low frequent to a low frequent domen

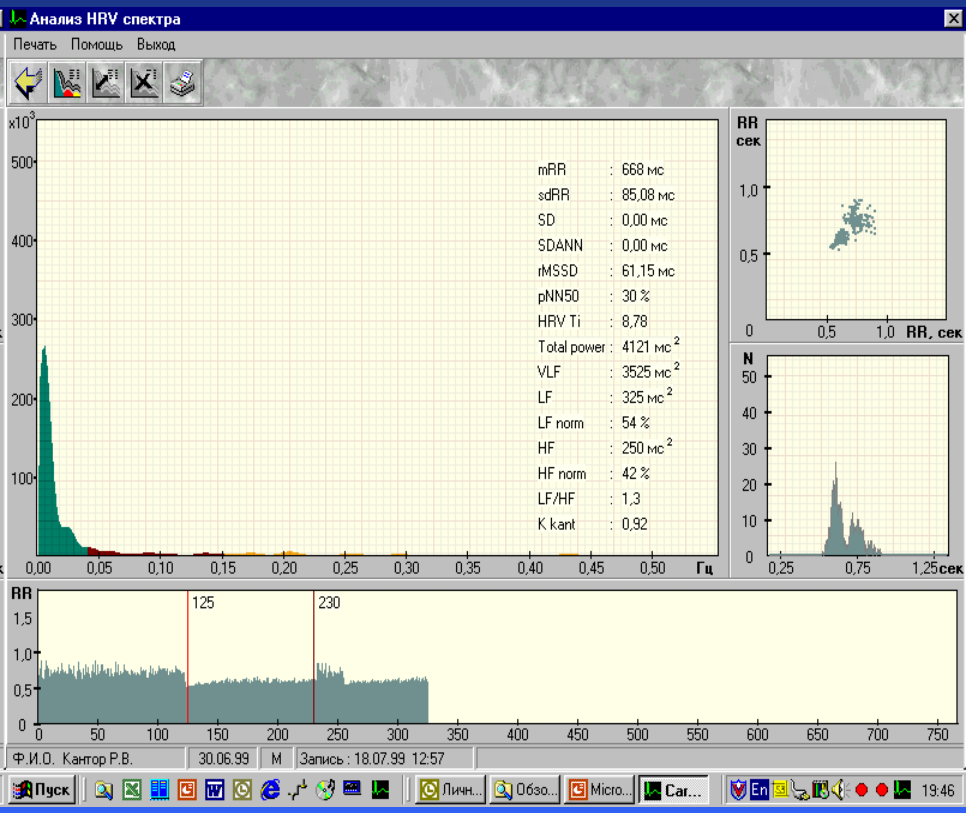
Patient C,67



Left, right windows – circles of high and low frequency fractals, rhythmgram, skatergram, a curve of cardiac circle length distribution – dual modal distribution, regeneration of a sinus note function after a pill of belloid

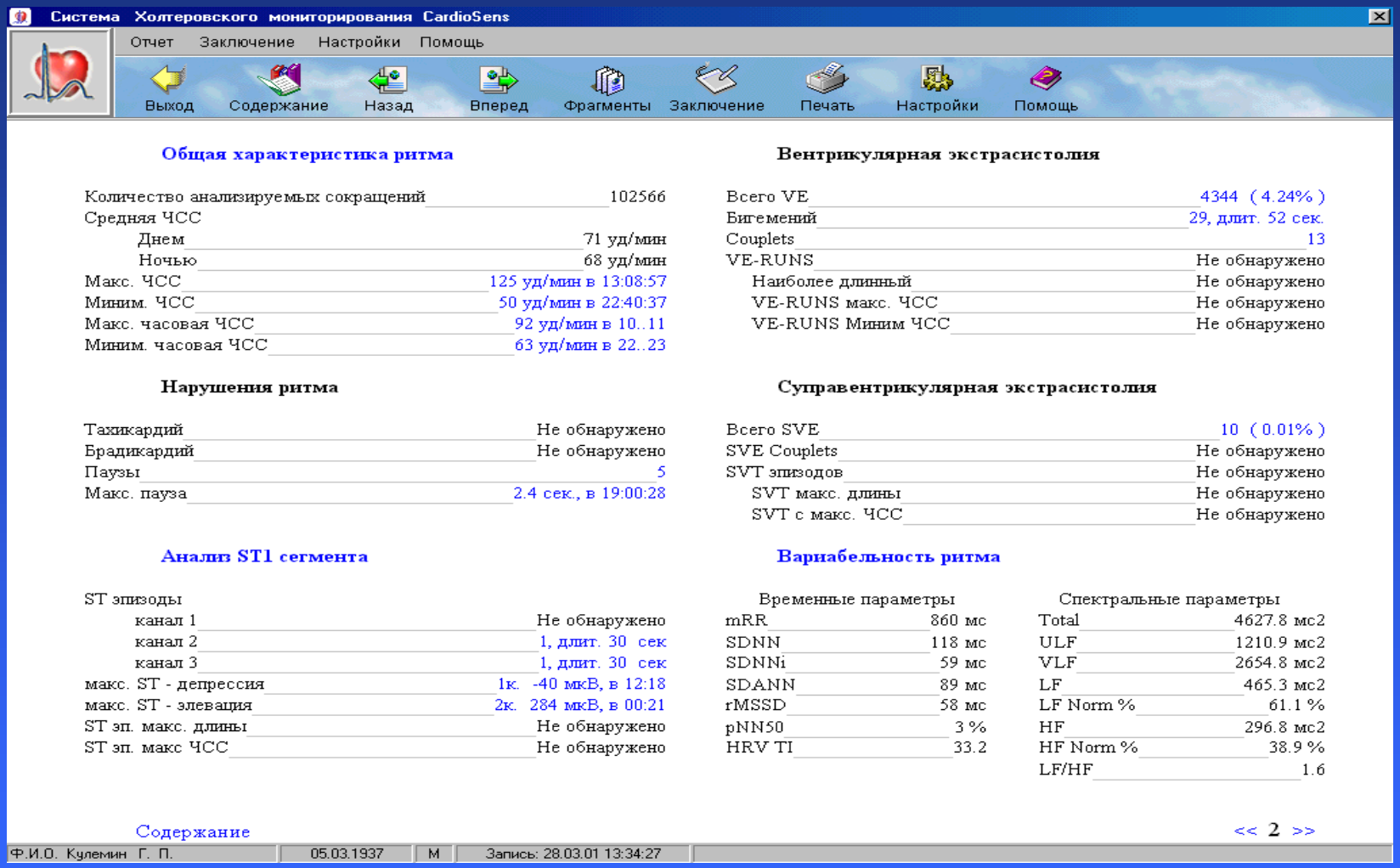
Patient D, 67





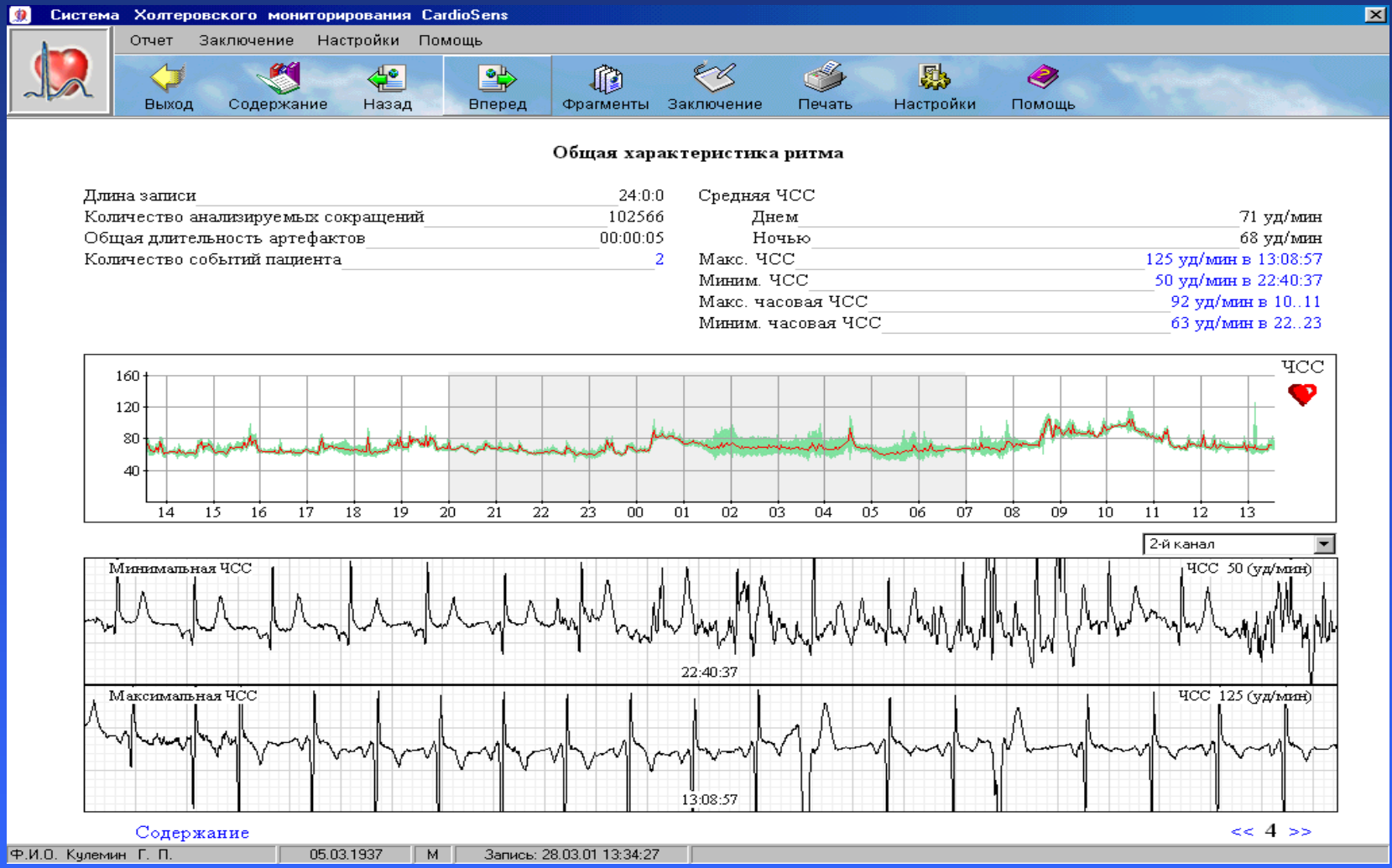
Spectrum resolution of rhythmgram from low and high frequent fractals, in both cases degeneration of vegetative regulation link, regeneration of a sinus note function after a pill of belloid

Patient E, 63, Acute myocardial infarction,
can't believe my eyes



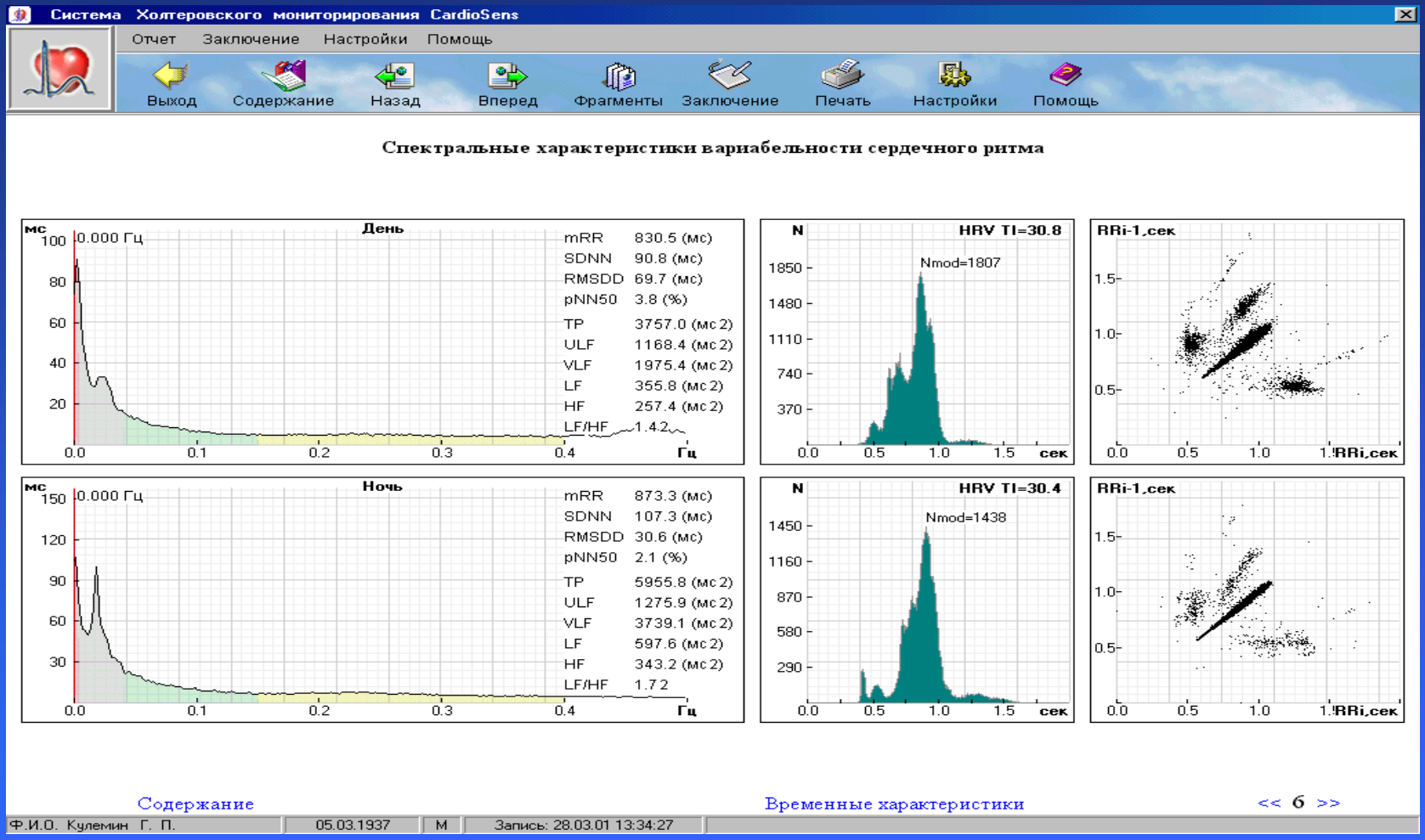
Halter monitoring: false impression about dipper HR, «false» HRV rates

Patient F, 63, Acute myocardial infarction,
something happened to illegibility



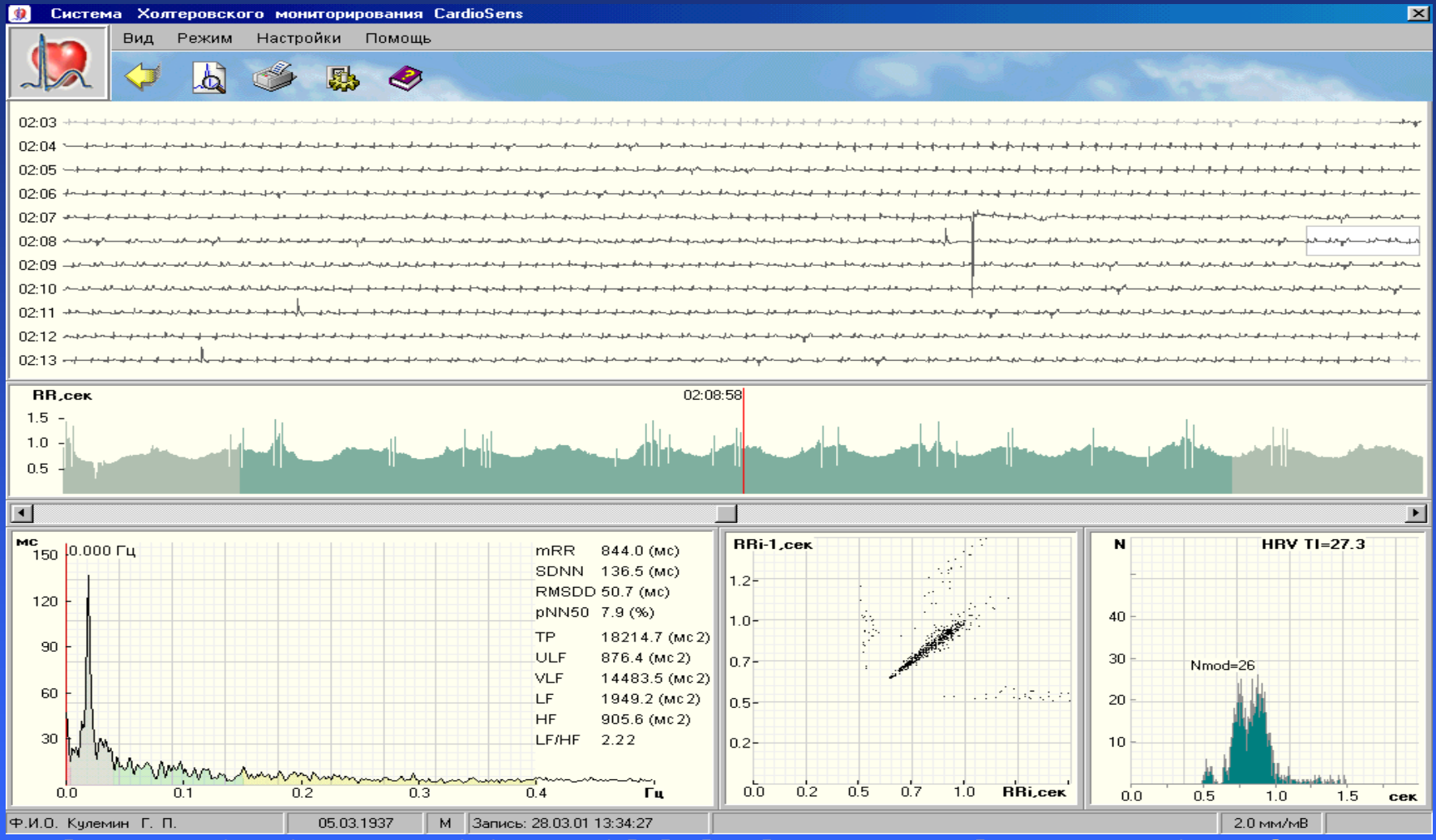
Halter monitoring: non-dipper HR

Patient G, 63, Acute myocardial infarction



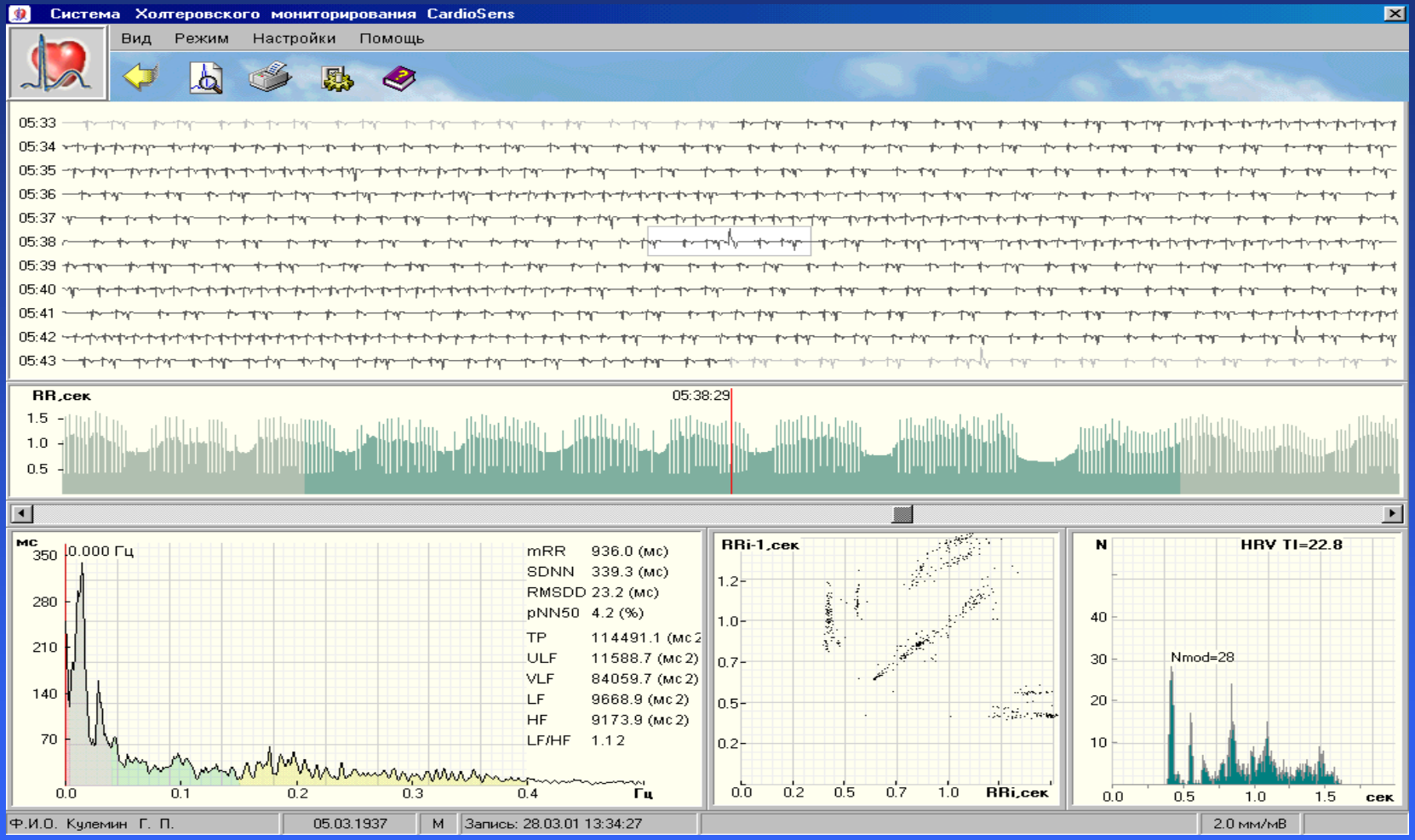
Halter monitoring: Distribution and skatergram RR-intervals – on the background of basic rhythm monotopic extrasystole with a higher frequency at day time, HRV defies a spectrum analysis in a standard minute.

Patient H, 63, Acute myocardial infarction



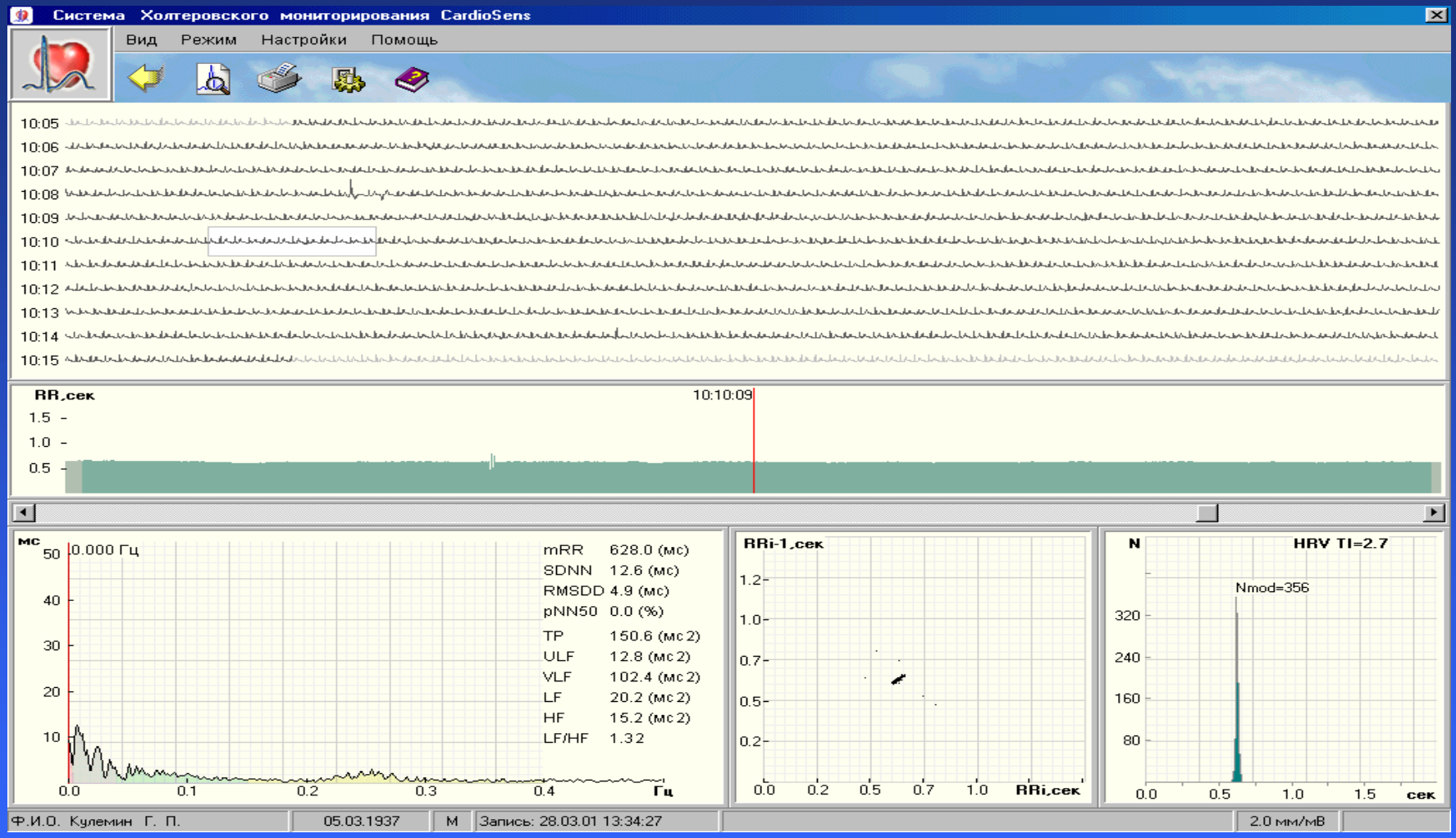
Halter monitoring: quasicinussoidal rhythmgram – demonstration of significant disorders of humoral regulation, extrasystoles in periods of "long" RR-intervals.

Patient I, 63, Acute myocardial infarction



Halter monitoring: quasicinussoidal rhythmgram - demonstration of significant disorders of humoral regulation, episode of frequent extrasystoles in periods of “long” RR-intervals.

Patient J, 63, Acute myocardial infarction



Halter monitoring: Pendulum-like rhythm – “degeneration” of regulation

The Zutphen Study (1088 patients examined)

Conclusion:

Low heart rate variability is associated with a high death rate among elderly age people as well as among mean age people

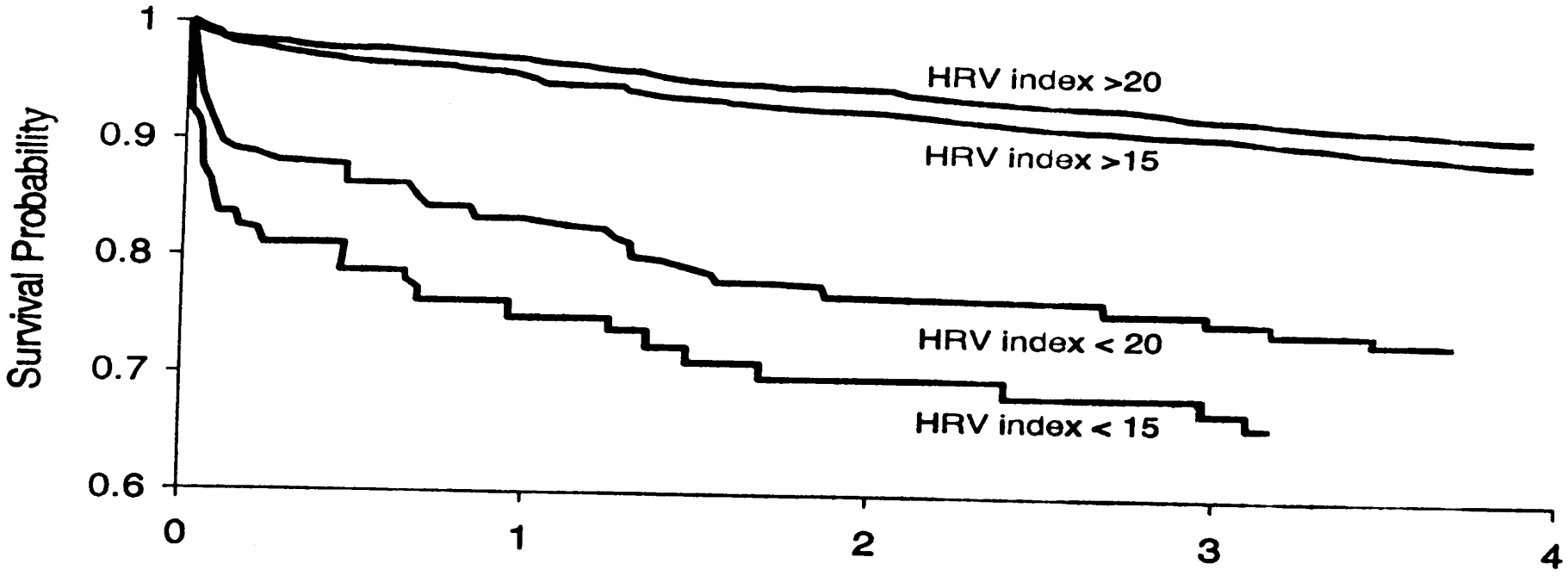
Low heart rate variability indicates a low level of health in general including immune functions

JM Dekker, EG Schouten, P Klootwijk at al// Am J Epidemiol., 1997, v.145, N10, 899-908.

What does The Zutphen Study mean, or how to read between the lines The Zutphen Study

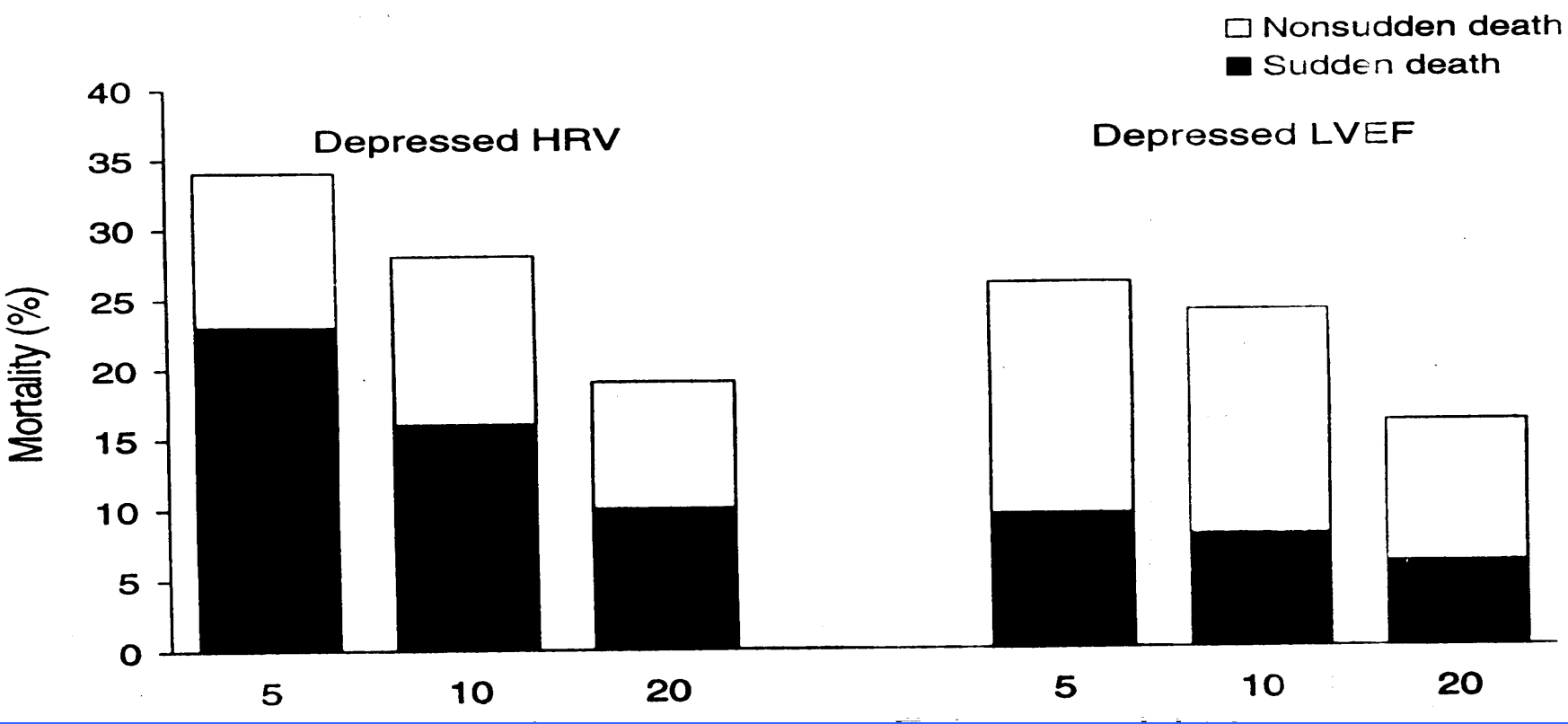
Of course, *not only*"low heart rate variability is associated with a high death rate among elderly age people as well as among mean age people " , *but* low non-perfect regulation , when besides there are some problems with heart intelligibility.

HRV index and survival probability



CM Pratt, AL Waldo, AJ Camm// Am. Heart J 1998, v. 81, 24D-34D.

Depressed HRV – high rate of sudden death, depressed left ejection fraction (LVEF) – high rate of non-sudden death



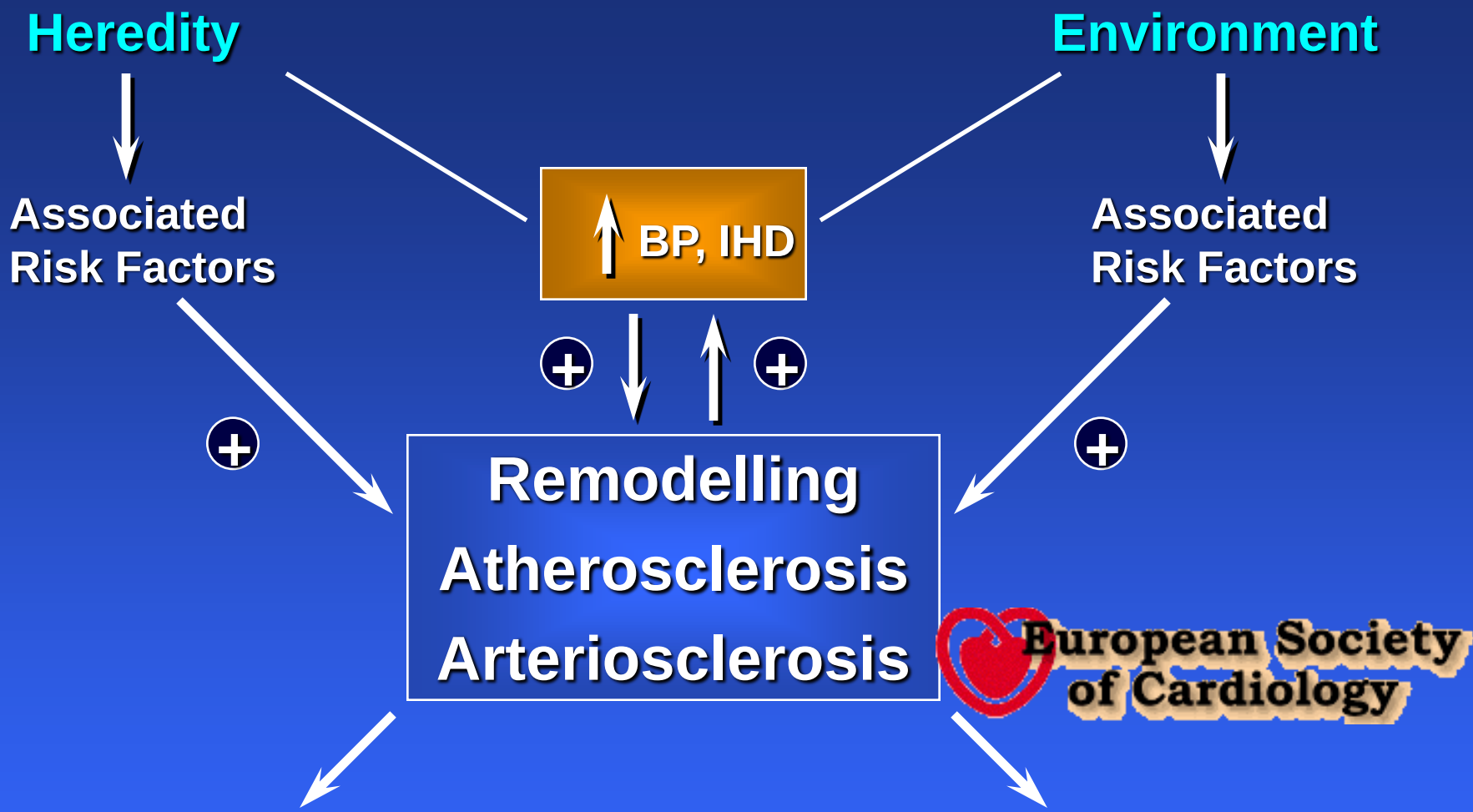
CM Pratt, AL Waldo, AJ Camm//Am Heart J. 1998, v. 81, 24D-34D.

So,what is heart illegibility in CHD?

Old and forgotten things from the West

- Pavlov's nervism as a philosophy of health and disease
- clinical supplement of Pavlov's nervism in the cortico-visceral theory of somatic diseases

ESC: Hypertension, heart failure and infarction: Evidence for ACE-inhibitor-based treatment?

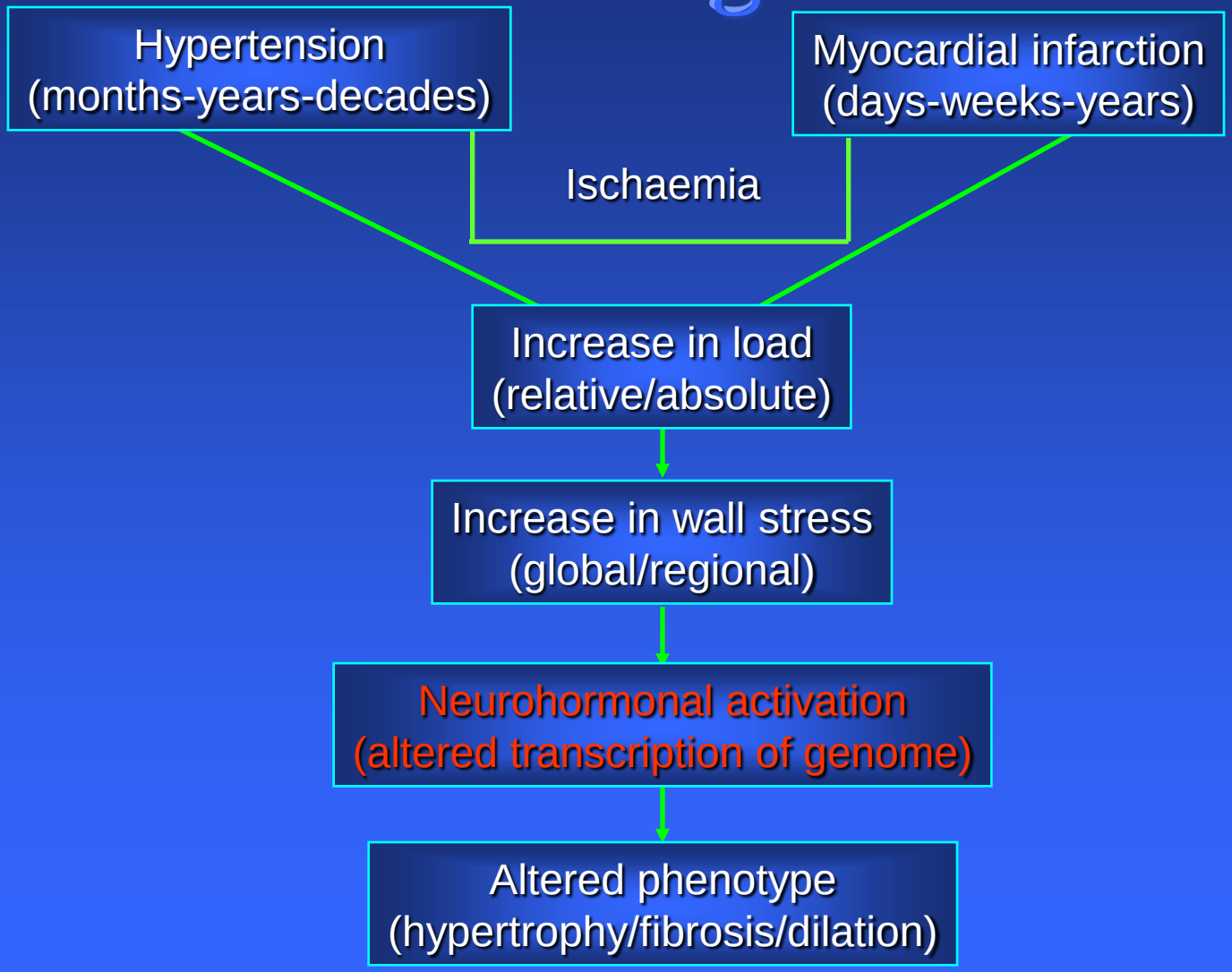


No place for regulation!
It is out of day!

There is a place for regulation !
Is it just enough?

European Society of Cardiology

Remodelling Process



Consequences of *heart illegibility* in CHD diagnostic

Accents

- **Patient's health state in general**
- **Psycho –social portrait of a patient**
- **Development and balance of neurohumoral regulation**
- **Cogniguity of neurohumoral regulation**
- **The role of medical and psycho-social factors in CHD indication and prognosis**
- ***Quality of patient's life***

Consequences of *heart illegibility* for CHD patients conducting

- Integrative medical and psycho-social approach
- Cognitive behavior therapy
- Neurohumoral regulation optimizing
- Traditional therapy

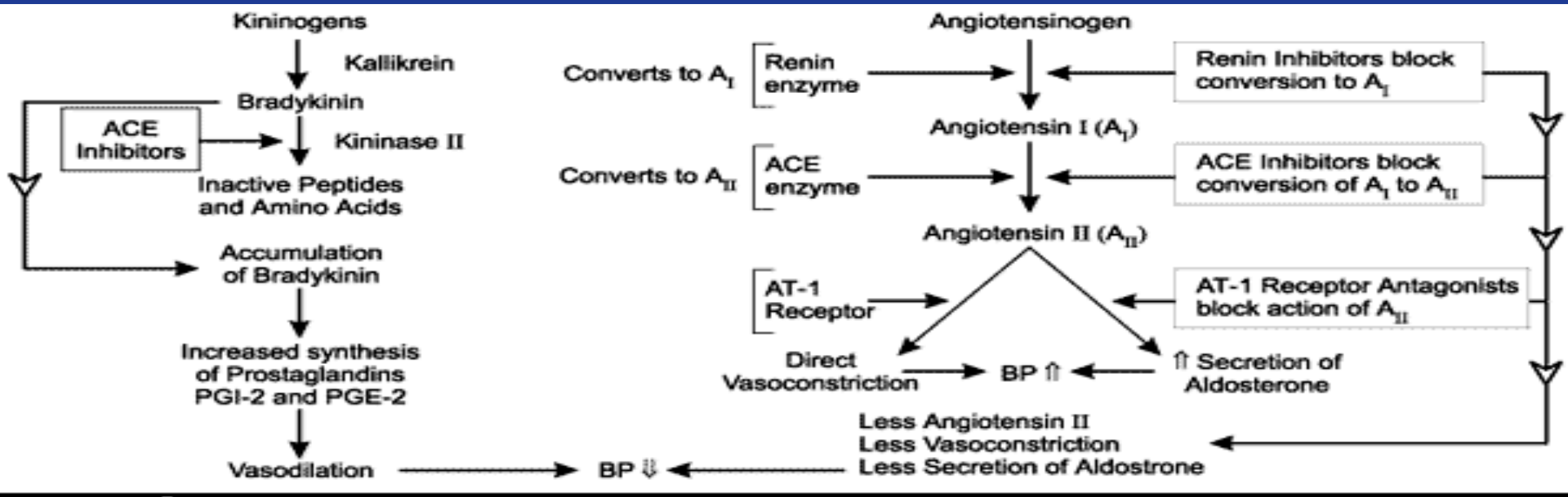
European Society of Cardiology

Neurohumoral modulation in clinic -*heart illegibility* dictates!

- Only now we start to understand the role of disorders and the necessity of NHR modulation
- Effects of many medicaments through NHR
  - B-blockades
  - Inhibitors ACI
  - Spironolacton diuretics
  - Digoxin *(digoxin for all!)*
- And some new medicines (selective antogonist aldosteron receptors – eplerenon, NEP(neutral endopeptidase)-ACE-I – omapatrilat, endotelin antagonists – selective and non-selective (bosentan), metalproteas inhibitors, and others.
- And besides immune and inflammation modulation, molecular-genetic therapy…

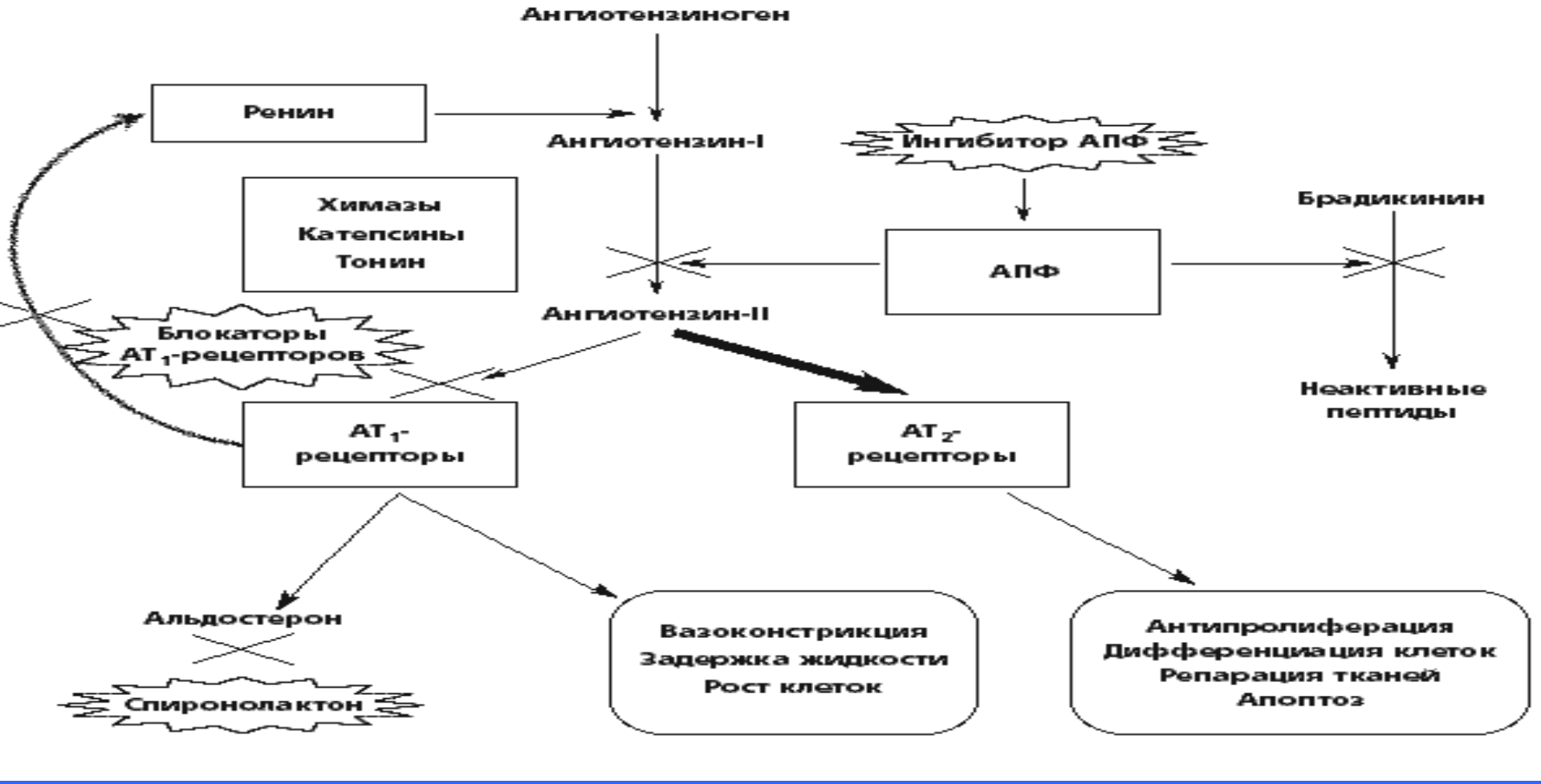
Are we ready?

Site of action of ACE inhibitors and angiotensin II receptor blockers

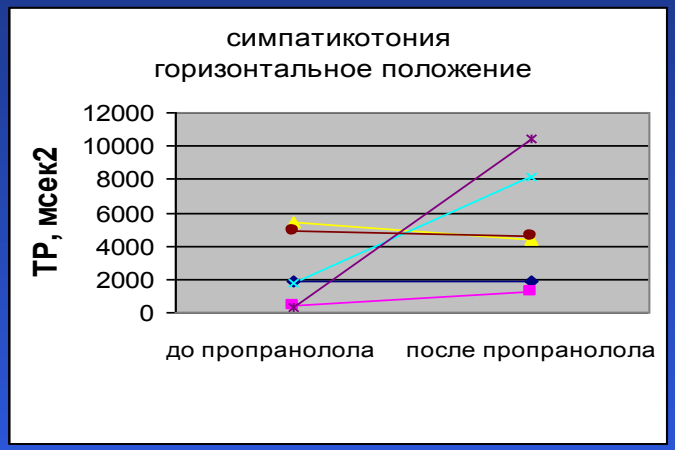


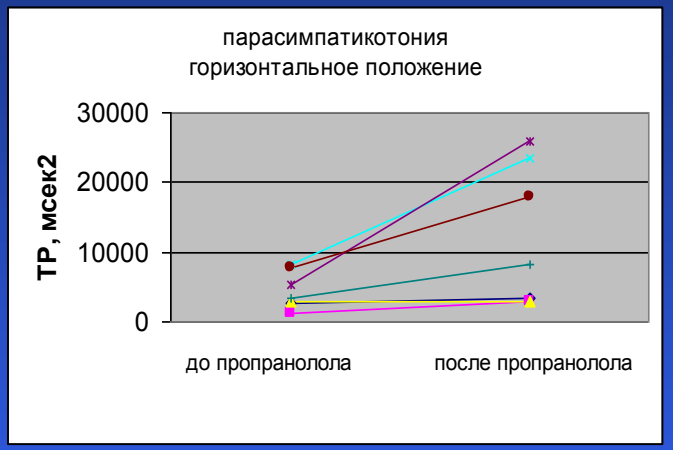
- I. Mode of action of ACE inhibitors: block conversion of A_I (an inactive substance) to A_{II} (a vasoconstrictor). This action (1) decreases the generation of A_{II}, and also by blocking the activity of kininase II, (2) decreases the breakdown of bradykinin: this vasodilator substance increases; blood pressure is lowered. II. Mode of action of angiotensin II (AT-1) receptor blocker: blocks effects of A_{II}; aldosterone secretion is not increased and vasoconstriction is prevented; *no effect on bradykinin system*.

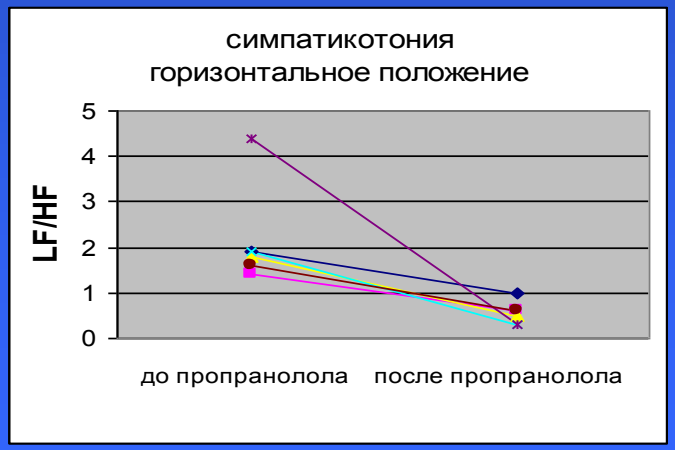
Possible levels of RAAS blockades

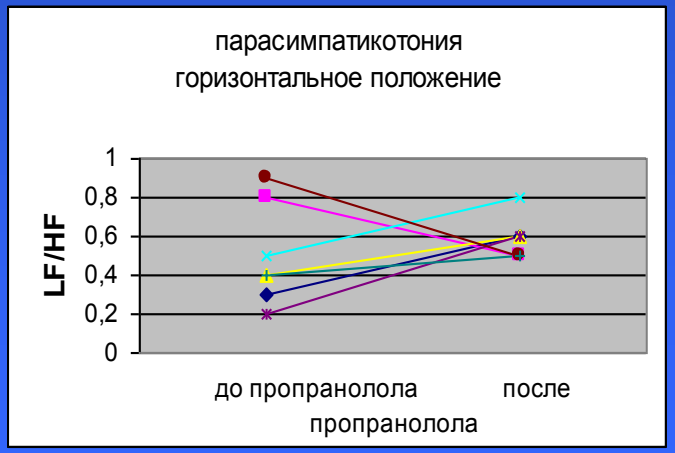


B-blockators , ACE inhibitors,spironolactonic diuretics, digoxin increase NHR power and modulate sympathetic-vagal balance



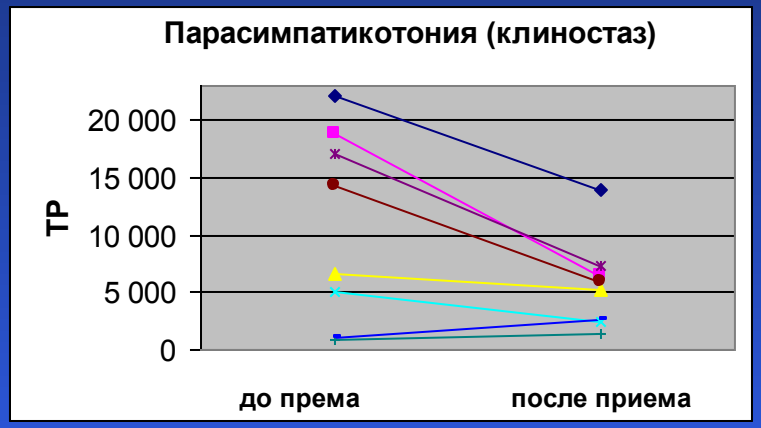


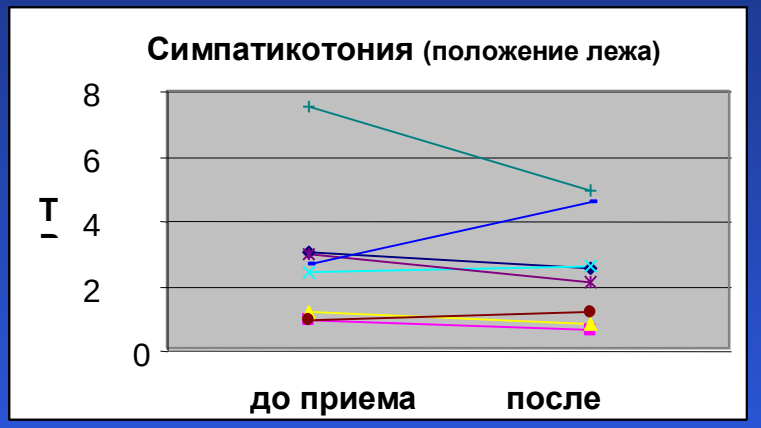


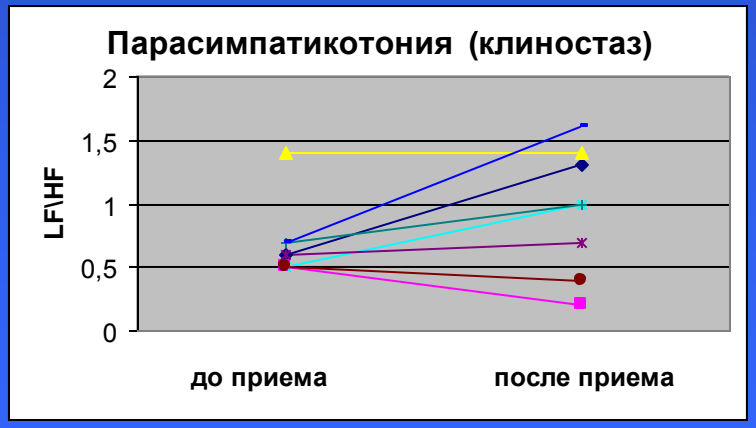


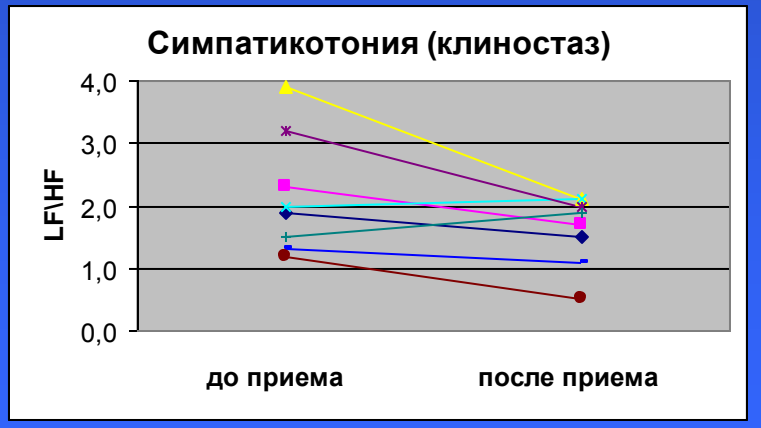
Anaprilin influence on TP, LH|/HF in an acute pharmacological dose of healthy volonteers

Not all preparations have such an influence









Here you are - cerucal

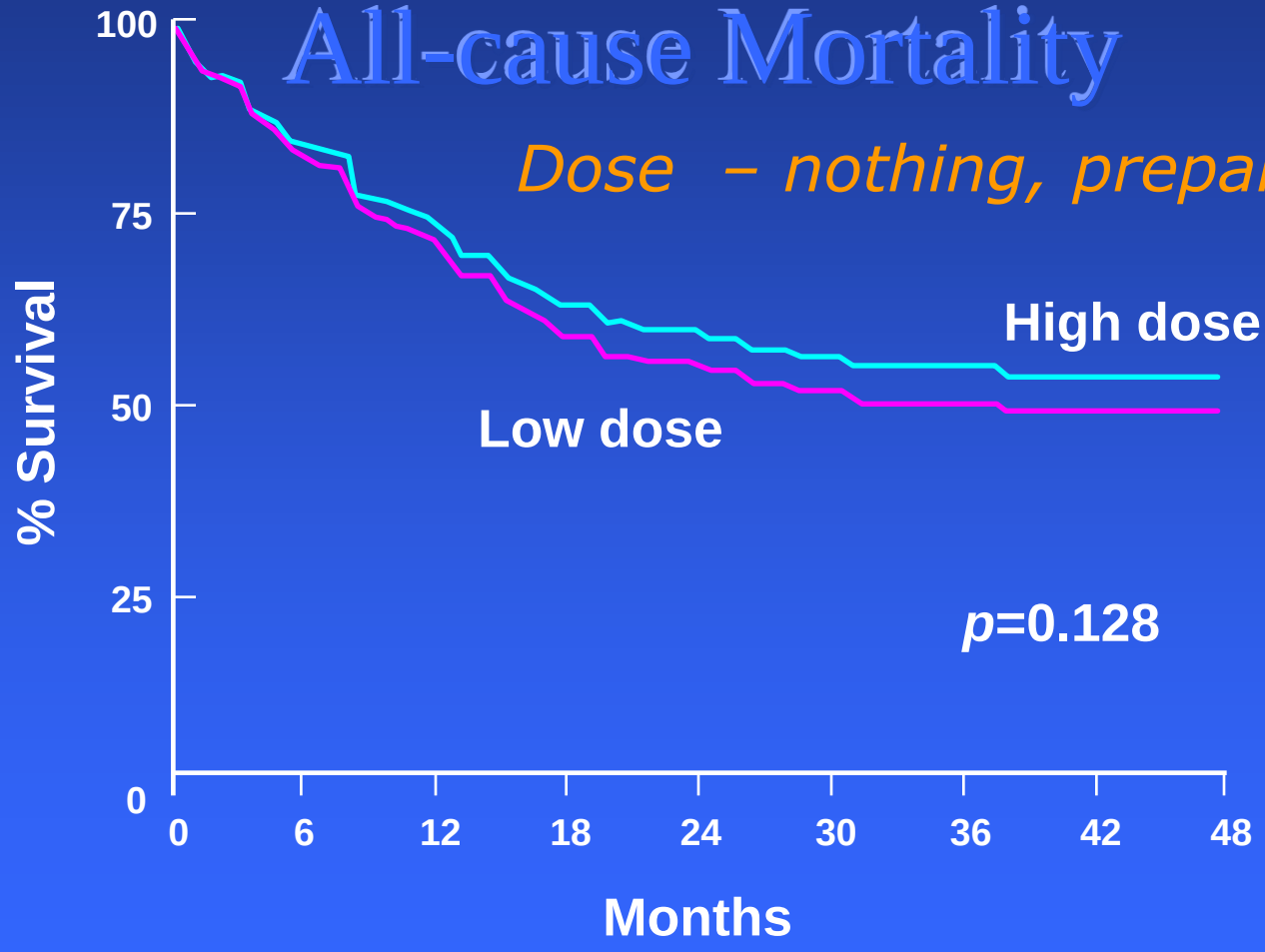
European Society of Cardiology

ATLAS

Assessment of Treatment with Lisinopril And Survival

All-cause Mortality

Dose – nothing, preparation – all !



And once again

Consequences of *heart illegibility* in CHD patients conducting

- Integrative medical and psycho-social approach
- Cognitive behavior therapy
- Neurohumoral regulation optimizing
- Traditional therapy*(if now we can call anything traditional therapy as it is)*

Medicaments therapy approaches

- Combination of preparations is preferable
- Add something new, but don’t increase a dose
- Dose titration
- No perepheric vasodilators
- NHR preparations are preferable

Our patient is a social(!) – biological Human Being, where the biological part serves for the social one, and biological can be ideal only within Nature, as they cannot exist separately. A regulation inseparability occurs good or bad depending on how lucky and successful you are. Or on your doctor's prescription. A bad regulation – what will the heart say? And what will we say to the heart? CHD is like a mine field! How can one cross it with a bad heart intelligibility?